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ABSTRACT

A study investigated the effects of S2RE, a metacognitive learning strategy, on the reading comprehension of second-, third-, and fourth-grade students, and evaluated its effects on the metacognitive knowledge of third- and fourth-grade students. Pretest and posttest reading comprehension scores for 218 students from a Mississippi delta school randomly assigned to experimental (S2RE) and control (basal) reading instruction treatment groups were used to evaluate research intervention effects. Significant difference in reading comprehension by grade level was revealed for grade level 3, and by grade level and gender for grade 3 females, in favor of the control group. The posttest measure of metacognitive knowledge administered to third- and fourth-graders revealed significant differences in favor of the experimental group for grade 3 and grade 3 females. Although results indicated that the S2RE strategy is no more effective in improving reading comprehension than basal reader instruction, some of those receiving S2RE instruction did show significant gains in metacognitive knowledge. (Fifteen tables of data are included; 15 references are attached.) (Author/RS)

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# The Effects of S2RE, A Metacognitive Learning Strategy, On the Reading Comprehension of Elementary Students

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ABSTRACT

This study investigated the effects of S2RE, a metacognitive learning strategy, on the reading comprehension of second, third and fourth grade students; and evaluated the effects of S2RE on the metacognitive knowledge of third and fourth grade students.

Pretest (1991) and posttest (1992) reading comprehension scores for 218 students randomly assigned to experimental (S2RE) and control (basal) reading instruction treatment groups were used to evaluate research intervention effects. Significant difference in reading comprehension by grade level was revealed for grade level 3, and by grade level and gender for grade 3 females, in favor of the control group.

The posttest measure of metacognitive knowledge administered to third and fourth graders revealed significant difference in favor of the experimental group for grade three and grade three females. Although results indicated that the S2RE strategy is no more effective in improving reading comprehension than basal reader instruction, some of those receiving S2RE instruction did show significant gains in metacognitive knowledge.

## INTRODUCTION

Comprehension is the central focus and primary goal of all aspects of reading. Yet, continued and increasing concern exists regarding the inability of significant numbers of students to demonstrate adequate reading comprehension proficiency. Dole, Duffy, Roehler and Pearson (1991) suggest that this inadequacy may be due to traditional views of reading.

Research findings reveal that critical phases of comprehension instruction, which emphasize the interactive nature of reading and the constructive nature of comprehension, have been omitted. These findings have resulted in a new cognitively based view of reading comprehension (Anderson, Hiebert, Scott & Wilkinson, 1985; NAPE, 1985; Orasanu & Penney, 1986).

Research provides evidence that successful readers strategically apply certain reading behaviors when they read to construct meaning and to learn. Unsuccessful readers do not use nor possess these behaviors and need explicit instruction on how to become strategic readers (Baumann & Schmitt, 1986; Harp, 1988; Weinstein, Ridley, Dahl & Weber, 1989).

Several researchers have found that students achieve when teachers provide direct, explicit instruction in comprehension learning strategies

(Palinscar & Brown 1984, 1985: Palincsar & Ransom, 1988; Palincsar, Ransom, & Derber, 1989; Paris, Lipson & Wixson, 1983; Paris, Cross, & Lipson, 1984; Schmitt, 1990; Schmitt & Newby, 1986).

This study investigated and measured the effectiveness of S2RE, a metacognitive learning strategy, on improving the reading comprehension of second, third and fourth grade students. It also evaluated the effects of S2RE on the metacognitive knowledge of third and fourth grade students.

## METHOD

### Subjects

Research participants were 218 students from a small Mississippi Delta school district with a high percentage of minority and low income students. The sample included 111 second graders, 84 third graders and 84 fourth graders who comprised four second grade classes; four third grade classes; and three fourth grade classes. Two of four intact lateral teaching teams were randomly assigned to the experimental group. The two remaining teams comprised the control group for each grade level.

### Procedures

Training. Experimental group teachers received a written description of the S2RE strategy, which was explained by the researcher and discussed. Also,

sample teacher, student and activity lesson procedures were received, explained and discussed in detail. Teachers received S2RE strategy demonstration lessons by the researcher and teacher observation critiques twice a month. Teachers observed and cr'-iqued each other.

Treatment. Experimental subjects were taught the use of the S2RE strategy for all comprehension skills studied for a period of one school year (180 teaching days). A 90 minute block of time was allocated for reading with no less than 30 minutes a day assigned to comprehension instruction. S2RE strategy instruction followed the order and method presented in the instructions.

Hypotheses. The following four null hypotheses were tested:

Null Hypothesis 1. There will be no significant difference in the reading comprehension scores on the Stanford Achievement Test (SAT 8) between experimental groups who received direct instruction in the S2RE strategy and control groups who received traditional basal reader instruction by grade level.

Null Hypothesis 2. There will be no significant difference in the reading comprehension scores on the SAT between experimental groups who received direct instruction in the S2RE strategy and control groups who

received traditional basal reader instruction by grade level and gender.

Null Hypothesis 3. There will be no significant difference in the composite scores on the Metacomprehension Strategy Index (MSI) between experimental groups who received direct instruction in the S2RE strategy and control groups who received traditional basal reader instruction by grade level for grades 3 and 4.

Null Hypothesis 4. There will be no significant difference in the composite scores on the MSI between experimental groups who received direct instruction in the S2RE strategy and control groups who received traditional basal reader instruction by grade level for grades 3 and 4, and gender.

Assessment. The Reading Comprehension subtest of the SAT 8 was the primary measure of reading comprehension for the pretests and posttests. Students' metacognitive knowledge (awareness) was measured using the MSI, developed by Schmitt (1990). This questionnaire measured students' awareness of a variety of metacomprehension behaviors within six broad categories: (a) predicting and verifying; (b) previewing; (c) purpose setting; (d) self-questioning; (e) drawing from background knowledge; and, (f) summarizing and supplying "fix-up" strategies.

Data collected to test the hypotheses consisted of pretest (1991) and posttest (1992) National Normal Curve Equivalent Scores (N/NCE) from the Reading Comprehension subtest of the SAT 8 for grade levels 2, 3 and 4. Composite posttest scores (0-100) from the MSI were used to examine the metacognitive knowledge of students in grade levels 3 and 4.

Analysis. One-way analysis of covariance (ANCOVA) was used to analyze adjusted posttest reading comprehension group means. F-ratios were computed to test the main effects of S2RE on reading comprehension.

The analysis of variance (ANOVA) was used to compare posttest group means for the experimental and control groups on the MSI. A significance level of .05 was utilized as the criteria to test the four null hypotheses.

## RESULTS

Hypothesis 1. The experimental and control groups were compared by grade for grade levels 2, 3 and 4. The hypothesis was accepted at grade levels 2 (see Table 1) and 4 (see Table 2), but was rejected at grade level 3 (see Table 3) in favor of the control group.

Table 1

Analysis of Covariance of Reading Comprehension Scores for Grade 2

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 668.534 | 1 | 668.534 | 1.815 | .182 |
| Main Effects | 1.593 | 1 | 1.593 | .004 | .948 |
| Explained | 670.127 | 2 | 335.064 | .910 | .407 |
| Residual | 25412.413 | 69 | 368.296 | | |
| Total | 26082.540 | 71 | 367.360 | | |

Table 2

Analysis of Covariance of Reading Comprehension Scores for Grade 4

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 3305.600 | 1 | 3305.600 | 13.854 | .000 |
| Main Effects | 41.793 | 1 | 41.793 | .175 | .677 |
| Explained | 3347.394 | 2 | 1673.697 | 7.015 | .002 |
| Residual | 166225.086 | 68 | 238.604 | | |
| Total | 19572.480 | 70 | 279.607 | | |

Table 3

Analysis of Covariance of Reading Comprehension Scores for Grade 3

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 2082.329 | 1 | 2082.329 | 14.061 | .000 |
| Main Effects | 631.388 | 1 | 631.388 | 4.264 | .043 |
| Explained | 2713.717 | 2 | 1356.858 | 9.162 | .000 |
| Residual | 10662.568 | 72 | 148.091 | | |
| Total | 13376.285 | 74 | 180.761 | | |

Hypothesis 2. The experimental groups and the control groups were compared by grade level and by gender. Hypothesis two was accepted at all three grade levels for males (see Tables 4, 5, 6) and at grade levels 2 (see Table 7) and 4 (see Table 8) for females. Yet it was rejected by grade level 3 (see Table 9) females, in favor of the control group.

Table 4

Analysis of Covariance of Reading Comprehension Scores for Grade 2 Males

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 1775.581 | 1 | 1775.581 | 3.862 | .057 |
| Main Effects | 386.559 | 1 | 386.559 | .841 | .365 |
| Explained | 2162.140 | 2 | 1081.070 | 2.351 | .109 |
| Residual | 17010.590 | 37 | 459.746 | | |
| Total | 19172.730 | 39 | 491.608 | | |

Table 5

Analysis of Covariance of Reading Comprehension Scores for Grade 3 Males

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 1155.977 | 1 | 1155.977 | 9.383 | .005 |
| Main Effects | 31.497 | 1 | 31.497 | .256 | .617 |
| Explained | 1187.473 | 2 | 593.737 | 4.819 | .017 |
| Residual | 3203.155 | 26 | 123.198 | | |
| Total | 4390.628 | 28 | 156.808 | | |

Table 6

Analysis of Covariance of Reading Comprehension Scores for Grade 4 Males

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 1393.388 | 1 | 1393.388 | 5.959 | .020 |
| Main Effects | 68.379 | 1 | 68.379 | .292 | .592 |
| Explained | 1461.766 | 2 | 730.883 | 3.126 | .058 |
| Residual | 7482.133 | 32 | 233.817 | | |
| Total | 8943.899 | 34 | 263.056 | | |

Table 7

Analysis of Covariance of Reading Comprehension Scores for Grade 2 Females

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 406.617 | 1 | 406.617 | 2.092 | .159 |
| Main Effects | 339.415 | 1 | 339.415 | 1.746 | .197 |
| Explained | 746.032 | 2 | 373.016 | 1.919 | .165 |
| Residual | 5637.065 | 29 | 194.382 | | |
| Total | 6383.097 | 31 | 205.906 | | |

Table 8

Analysis of Covariance of Reading Comprehension Scores for Grade 4 Females

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 1829.321 | 1 | 1829.321 | 7.197 | .011 |
| Main Effects | 310.273 | 1 | 310.273 | 1.221 | .277 |
| Explained | 2139.594 | 2 | 1069.797 | 4.209 | .024 |
| Residual | 8387.725 | 33 | 254.173 | | |
| Total | 10527.319 | 35 | 300.781 | | |

Table 9

Analysis of Covariance of Reading Comprehension Scores for Grade 3 Females

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Covariate | 617.117 | 1 | 617.117 | 3.770 | .059 |
| Main Effects | 710.080 | 1 | 710.080 | 4.337 | .043 |
| Explained | 1327.197 | 2 | 663.598 | 4.054 | .024 |
| Residual | 7039.511 | 43 | 163.710 | | |
| Total | 8366.707 | 45 | 185.927 | | |

Hypothesis 3. Composite scores from the MSI were compared for the experimental groups and the control groups for grade levels 3 and 4. This hypothesis was rejected at grade level 3 (see Table 10) in favor of the experimental group. However, the hypothesis was accepted at grade level 4 (see Table 11).

Table 10

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 3

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 3446.525 | 1 | 3446.525 | 12.050 | .001 |
| Explained | 3446.525 | 1 | 3446.525 | 12.050 | .001 |
| Residual | 20879.021 | 73 | 286.014 | | |
| Total | 24325.547 | 74 | 328.724 | | |

Table 11

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 4

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 3.086 | 1 | 3.086 | .013 | .910 |
| Explained | 3.086 | 1 | 3.086 | .013 | .910 |
| Residual | 16444.660 | 69 | 238.328 | | |
| Total | 16447.746 | 70 | 234.968 | | |

Hypothesis 4. Composite scores (MSI) of the experimental groups and the control groups at grade levels 3 and 4, were compared by gender. The hypothesis was accepted for grade levels 3 (see Table 12) and 4 males (see Table 13); rejected for grade level 3 females (see Table 14) in favor of the experimental group; and accepted for grade level 4 females (see Table 15).

Table 12

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 3 Males

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 85.123 | 1 | 85.123 | .380 | .543 |
| Explained | 85.123 | 1 | 85.123 | .380 | .543 |
| Residual | 6043.429 | 27 | 223.831 | | |
| Total | 6128.552 | 28 | 218.877 | | |

Table 13

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 4 Males

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 36.772 | 1 | 36.772 | .152 | .699 |
| Explained | 36.772 | 1 | 36.772 | .152 | .699 |
| Residual | 7997.971 | 33 | 242.363 | | |
| Total | 8034.743 | 34 | 236.316 | | |

Table 14

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 3 Females

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 4675.162 | 1 | 4675.162 | 15.4351 | .000 |
| Explained | 4675.162 | 1 | 4675.162 | 15.435 | .000 |
| Residual | 13327.273 | 44 | 302.893 | | |
| Total | 18002.435 | 45 | 400.054 | | |

Table 15

Analysis of Variance of Metacomprehension Strategy Index Scores for Grade 4 Females

| Source of Variation | Sum of Squares | DF | Mean Square | F | Signif. of F |
|---|---|---|---|---|---|
| Main Effects | 24.821 | 1 | 24.821 | .102 | .751 |
| Explained | 24.821 | 1 | 24.821 | .102 | .751 |
| Residual | 8251.485 | 34 | 242.691 | | |
| Total | 8276.306 | 35 | 236.466 | | |

## SUMMARY

Study results indicated that, for hypotheses one and two, there were significant differences at the .05 level of significance between the experimental and control groups at grade level 3 and for grade level 3 females. Mean gains (Experimental 41.586; Control 47.456) favored grade 3 control group. Mean gains (Experimental 42.707; Control 50.617) for grade level 3 females also favored the control group.

Results for hypotheses three and four indicated that levels of significance (.05) were also achieved between experimental and control groups at grade level 3 and for grade level 3 females. Grade level 3 posttest mean scores (Experimental 39.243; Control 25.683) and grade level 3 females posttest mean scores (Experimental 54.182; Control 24.002) were in favor of the experimental group.

## CONCLUSIONS

The results of this study suggest that the S2RE strategy as measured by the SAT 8 is no more effective than traditional basal reader instruction to improve reading comprehension performance. In fact, where significant difference was attained, it was in favor of the basal reader approach. Metacognitive knowledge performance was consistent with reading comprehension performance results for grade level 3. The hypothesis

was rejected for the grade level, accepted for males, and rejected for females. However, in all cases for the MSI, the experimental groups achieved higher mean scores than the control groups.

Findings for grade level 3 were consistent with those of Paris, Cross and Lipson (1984) regarding metacognitive knowledge and reading comprehension. Though the S2RE strategy was not specifically designed to increase students' metacognitive knowledge, strategy components and procedural steps for strategy application were designed to stimulate greater awareness of cognitive processes and behaviors required for reading comprehension tasks. Therefore, it was reasoned that students' heightened metacognitive awareness, along with strategy knowledge and knowledge of how to apply strategies, would prompt students to select and use those strategies which would help them achieve reading comprehension.

Metacognitive knowledge performance was also consistent with reading comprehension performance for grade level 4 for both grade and gender. There was no mean score difference for grade level or gender.

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